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An Analysis of a Horse from Umm el-Jimal, Jordan

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Introduction\

Umm el-Jimal (also known as Umm idj-Djimal or Umm al-Jimal) is a current town and archaeological site that is located in northern Jordan, in the southern Hauran region (de Vries pamphlet). The village of Umm el-Jimal was settled by local people under Nabatean influence in the 1st century C.E. (de Vries 1990:7-8). When the area became part of Rome's Provincia Arabia in the 2nd century, the village remained untroubled, until after a rebellion in Palmyra. In the 4th century, the village masonry was used to build a fortified town to the northwest; Umm el-Jimal in the 4th and 5th centuries was a part of the Roman frontier (de Vries 1990:9). As Roman imperial control waned in the following centuries, Byzantine influence and Christianity spread to Umm el-Jimal (de Vries 1990:11). Under less centralized control, Umm el-Jimal became a local hub of agriculture and trade (de Vries 2007: 467). After the 7th century, Umm el-Jimal was under the Islamic influence of the Umayyad dynasty, until the population collapse in the 9th century following plague and an earthquake (de Vries 1990:11-12).

Thus, throughout its history, Umm el-Jimal has been inhabited by a variety of ethnic groups, including local agriculturalists, Safaitic-speaking nomads, and North African soldiers from the Third Cyrenaica Legion (MacDonald 1993:306-307; de Vries 2011:208). Umm el-Jimal also experienced a diverse set of religious beliefs, including paganism, Roman cult religions, and Byzantine Christianity (de Vries 2011:213).

During the 1998 field season, cemetery area CC was excavated, located to the northwest of the town, and associated with the late Roman/early Byzantine time period (Cheyney et al. 2004:346). In pit CC 2.005, the remains of an equid (CC 2.021) and child grave (CC 2.025) were found in association (Cheyney et al. 2004:348-349). The equid CC 2.021 was buried first,

with all bones articulated, along a north-south axis, with the head facing east (Figure 1). Associated artifacts included a set of 3 metal rings and a bell, which are interpreted as a halter (Figure 2). Around this first burial were post holes, indicating the grave was covered with a tent or wooden structure. Later, another pit was dug to inter a 2-3 year old child. The child was oriented southwest and southeast, with the head facing southwest. Grave CC 2.025 was placed against and below the horse's forelegs, with a line of rocks separating the child from the horse's belly. Due to the articulation of the horse, past research determined that the two graves were associated, with pit CC 2.025 dug shortly after CC 2.021. After skeletonization of the horse, an intrusive pit (CC 2.018) was dug to hold possible other grave goods or a different burial (Cheyney et al. 2004:349). The child burial was associated with a leather shroud or blanket wrapped about the head and behind the legs, as well as strings of glass beads around the ankles and neck (Site notes).

Once the site was excavated, the CC 2.021 horse bones were transported and stored at Grand Valley State University's anthropology lab, and no further analysis has been conducted. Questions remain about the breed, height, age, and sex of the horse, as well as the ethnicity and religious nature of this animal burial, which are not common in Jordan (Jordan burials). This analysis aims to answer these questions through a preliminary zooarchaeological analysis of the Umm el-Jimal horse.

Methods

The bones were measured using a Mitutoyo Dial Caliper in mm (to the nearest 0.01 mm) and a Carolina measuring box in cm (to the nearest 0.1 cm). Skeletal elements were identified using Schmid's Atlas of Animal Bones (Schmid 1972), and measured following the criteria of

von den Driesch (1976). In the table of results, measurements were all converted to mm scale. In the table of results, measurements were all converted to mm scale.

The withers height of the animal was assessed using both the Vitt and May methods, as discussed in Johnstone (2004:153-156). To determine age of the horse, examination of the long bones was conducted to assess degree of epiphyseal fusion, as well as examination of incisor wear patterns (Johnstone 2004:107-109). Analysis of the sex of the horse was determined by examining for the presence of canine teeth; although comparing greatest length of long bones to shaft diameter is also useful in determining sex, this method proved impossible to implement due to poor preservation (Johnstone 2004:114).

In order to analyze the ethnic characteristics of the burial, photographs of the burial in situ were examined to estimate the size of the halter elements.

Results

See Tables 1-3 for a complete list of all measurements taken from the skeleton. The use of an 'x' indicates where incomplete preservation did not allow an accurate measurement to be taken.

Using the Kiesewalter method, as quoted in Johnstone, the lateral length was multiplied by the appropriate factor for the right radius and left metatarsus III (2004:153). Then, height estimates were calculated using the adjusted factors proposed by May (Johnstone 2004:156). The estimates were made using the lateral length and greatest length of the right radius and left metatarsus III. In Figure 3, the results are summarized, with error bars of 45 mm both above and below the predicted value (Johnstone 2004:152).

All long bones and vertebral bodies were fused, no deciduous teeth were present, canines were erupted, with minimal wear on incisors and molars, indicating an age of about 6 years. The presence of two erupted canine teeth indicates that the horse is male. In addition, a canine and several vertebral bodies exhibited osteoarthritic lipping and lesion (Figure 4, 5).

By comparing the included scale in Figure 2, the large muzzle ring was approximately 8.7 cm in diameter, with the small temporal rings (assuming the not-visible ring on the other side of the cranium is symmetrical) approximately 1.3 cm in diameter. The bell under the chin was estimated at 2.1 cm long.

Discussion

Poor preservation conditions had rendered it impossible to determine the breed of the horse using comparisons of the size of cranial passages or the length of long bones in relation to diameter (morph skull and morph var.). As seen in figure 3, the height at withers estimate for this equid varied according to what skeletal element was examined. By contrast, within the same skeletal part, the various calculating methods (Keisewalter, May L1, and May GL) gave similar results. Using the right radius, the average withers height estimate was 1430 ±45 mm, while using the third metatarsal gave an estimate of 1493 ±45 mm. However, this range of difference is within the acceptable variation of 100 mm (Johnstone 2004:157). As can be seen in Figure 3, the error ranges overlapped, producing a combined withers height estimate of about 1450-1460 mm, a high value for the late Roman world, where horses were on average smaller than modern equids (Johnstone 2004:152).

Fusion of growth plates and tooth wear indicated that this horse was at least 6 years old, although other authors have discussed the unreliability of determining age past the fusion of

growth plates and the eruption of permanent dentition (Johnstone 2004:110). Next, this horse exhibits some age osteoporosis, which is linked to advanced age in horses, although traumatic injuries can cause an early onset of arthritis (Johnstone 2004:132-133). Although canine teeth presence is not completely reliable in determining sex, it remains the best option when the pelvis is poorly preserved or missing (Johnstone 2004:111). Next, this horse exhibits some age osteoporosis, which is linked to advanced age in horses, although traumatic injuries can cause an early onset of arthritis (Johnstone 2004:132-133). In addition, the presence of both canines and their well-developed morphology suggested that the horse was male.

The halter and bell artifacts were not specific to any known cultural group in the southern Hauran region. They were most likely made of a copper alloy, and left staining on teeth and other cranial bone fragments. The evidence for human burials with animals, especially horses, in northern Jordan is rare. However, more recent evidence has turned up an example of a primary inhumation adult horse burial along a trade route in Southern Jordan (al-Salameen and Falahat 2009:87). In that case, the east-west orientation of the burials, their lack of rich grave goods, and their lack of association with any nearby settlement caused the authors to postulate a nomadic origin (al-Salameen and Falahat 2009:96,99). The authors also remarked upon the connection to animal-human burials in the Arabian Peninsula, such as those found at Mleiha (al-Salameen and Falahat 2009:93). In Mleiha, several camels and two horses were interred in association with a complex of pit graves (Uerpmann 1999:105,107). Unfortunately, the graves were looted and human remains removed, meaning that no data on sex or age of individuals is possible (Uerpmann 1999:102-103). Another factor was the fact that the Umm el-Jimal burial concerned a child, which was unusual for late Roman cemeteries (de Vries 2011:206). However, in the southern Jordan burial and in Umm el-Jimal, there is higher representation for both females and

subadults in terms of grave numbers and richness of grave (de Vries 2011:206 Cheyney et al. 2004:353).

Therefore, the Umm el-Jimal horse burial may represent nomadic influence in burial practices and belief systems and local emphasis on the burial of children. The east-west orientation of the burial and inclusion of grave goods suggests the influence of pagan religious beliefs. No influence on this burial of the Roman military presence or Byzantine Christian beliefs can be inferred.

Conclusion

The Umm el-Jimal horse was a male, 6-year old horse that stood at an estimated height of 1450-1460 mm tall at the withers. It is similar to other nomadic-type burials from southern Jordan and the United Arab Emirates, and shows pagan religious influences.

For future work, it would be interesting to examine the relationship of this type of pit burial in relation to those found in the U.A.E., since this style of burial appears similar. In addition, currently the horse skeleton is housed in the original boxes as excavated from the site. For future analysis, it would be useful to reorganize the labels, since currently some of the bag titles are incorrect, such as the vertebrae in a bag labeled right ulna and radius, or unlabelled, such as the right humerus and radius. An ambitious project would also be to reconstruct the long bones of the horse, the majority of which are fragmented. Finally, the metal harness artifacts are currently in storage in Jordan, and it would be useful to take accurate measurements from the physical artifacts, instead of relying on site photographs.

Appendix: Tables and Figures

Figure 1. Horse skeleton in situ in section CC 2.021, Umm el-Jimal, Jordan.

Figure 2. Horse cranium from Umm el-Jimal, showing halter artifact elements, including muzzle ring, one of two rings at upper part of head, and bell underneath the chin.

Table 1. Measurements of Horse Cheekteeth. Columns in each element represent one tooth.

Element	Measurement	Value (in mm)							
Maxillary P2	L	29.49	29.80	34.99					
	B	23.22	22.89	23.64					
Maxillary P3-M2	L	26.44	25.04	23.23	22.89	21.83	26.26	21.49	25.50
	B	25.95	26.15	24.30	24.45	25.16	26.74	24.82	26.62
Mandibular P3-M2	L	25.78	23.74	23.14	24.02	25.91	25.04	23.10	23.69
	B	16.97	17.76	17.45	14.38	17.55	18.11	17.18	15.20
Mandibular M3	L	30.53	32.35	33.59					
	B	14.91	12.32	13.85					

Table 2. Measurements of Horse Vertebrae. Columns in each element represent one vertebra.

Element	Measure-ment	Value (in mm)																	
Cervical Vertebrae	PL	106.66	107.03	x	x	x	87.30	x											
	GLPa	125.11	x	127.39	x	x	91.69	x											
	Bpacr	x	82.63	x	x	x	x	x											
	Bpacd	x	83.54	x	71.00	x	x	63.41											
	BPtr	x	x	x	x	x	x	x											
	BF(cr/cd)	49.81	43.45	x	x	49.25	62.23	x											
	HF(cr/cd)	45.52	47.67	x	x	50.31	48.52	x											
	H	x	x	x	x	x	x	x											
Thoracic Vertebrae	PL	53.36	51.14	47.53	56.84	47.46	52.29	47.19	44.95	48.90	51.08	43.88	48.47	47.14	47.45	48.28	53.10	45.26	48.20
	BPtr	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	BF(cr/cd)	55.44	49.90	50.82	52.35	x	x	45.26	x	55.58	42.61	41.25	x	x	41.25	44.56	x	41.55	x
	HF(cr/cd)	40.32	41.12	47.81	44.09	42.28	38.26	37.31	x	37.61	x	x	36.30	x	35.16	x	41.54	x	x
	H	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Lumbar Vertebrae	PL	50.53	43.68	48.75	48.97	61.19	66.00												
	BPtr	x	199	70.61	70.28	x	x												
	BF(cr/cd)	x	55.86	63.74	64.31	64.76	62.62												
	HF(cr/cd)	x	24.78	41.72	45.28	41.01	42.19												
	H	x	x	x	x	x	x												
Caudal Vertebrae	PL	39.73	33.06	31.65	32.42	32.44	32.21	31.06	29.16	28.44	27.09	25.72							
	BPtr	57.72	51.95	48.19	41.26	34.54	24.21	17.28	14.20	13.69	12.41	x							
	BF(cr/cd)	27.94	25.77	24.55	22.65	22.44	19.36	17.39	14.51	12.72	11.89	x							
	HF(cr/cd)	23.90	24.00	23.05	20.66	18.70	16.64	16.00	x	12.55	11.51	x							
	H	51.58	37.81	x	24.19	22.31	20.81	17.34	13.82	13.36	12.10	x							

Table 3. Post-cranial skeletal measurements.

Element	Measurement	Value (in mm)			
Sacrum	GL	x			
	PL	x			
	GB	218			
	BFcr	52.37			
	HFcr	22.96			
Left Scapula	HS	x			
	DHA	x			
	Ld	x			
	SLC	x			
	GLP	94.42			
	LG	61.19			
	BG	47.19			
Left Humerus	GL	x	**Right Humerus**	GL	x
	GL1	x		GL1	x
	GLC	x		GLC	x
	Bp	97.84		Bp	99.11
	SD	x		SD	x
	Bd	84.52		Bd	x
	BT	79.56		BT	x
Left Radius	GL	x	**Right Radius**	GL	350
	PL	x		PL	349
	L1	x		L1	330
	BP	67.76		BP	85.97
	BFp	66.70		BFp	77.55

	SD	x			SD	44.76
	CD	x			CD	x
	Bd	79.55			Bd	81.60
	BFd	69.55			BFd	70.34
				Right Ulna	GL	x
					GL1	x
					LO	89.84
					DPA	68.66
					SDO	50.70
					BPC	47.85
Left Femur	GL	x		**Right Femur**	GL	x
	GLC	x			GLC	x
	Bp	x			Bp	x
	BTr	x			BTr	x
	DC	62.71			DC	60.34
	SD	x			SD	x
	CD	x			CD	x
	Bd	x			Bd	x
Left Patella	GL	65				
	GB	61				
Left Tibia	GL	x		**Right Tibia**	GL	x
	L1	x			L1	x
	Bp	103.65			Bp	x
	SD	x			SD	x
	CD	x			CD	x
	Bd	80.49			Bd	79.82
	Dd	53.03			Dd	51.40
Larger Carpal bones (left)	GB	38.82	46.65			
Left	GH	64		**Right**	GH	61

Astragalus					**Astragalus**		
	GB	68				GB	70
	BFd	56.70				BFd	57.02
	LmT	64.97				LmT	63.72
Left Calcaneus	GL	x			**Right Calcaneus**	GL	x
	GB	58.96				GB	54.50
Other tarsal bones	GB	28.79	51.01	39.07	41.33	27.13	27.89
Left Metatarsus III	GL	286			**Right Metatarsus III**	GL	x
	GL1	285				GL1	x
	L1	280				L1	x
	Bp	50.64				Bp	x
	Dp	50.68				Dp	x
	SD	x				SD	x
	CD	x				CD	x
	DD	x				DD	x
	Bd	54.75				Bd	55.08
	Dd	40.26				Dd	40.31
					Right Phalanx I	GL	91
						Bp	61.59
						BFp	58.86
						Dp	41.23
						SD	37.90
						Bd	49.12
						BFd	48.09
Left Phalanx II	GL	44	48		**Right Phalanx II**	GL	50
	Bp	30.90	56.60			Bp	56.67
	BFp	x	53.85			BFp	50.46
	Dp	30.32	34.46			Dp	36.00

	SD	25.66	52.20		SD	48.68
	Bd	29.57	53.56		Bd	51.54
Left Phalanx III	GL	71.56		**Right Phalanx III**	GL	x
	GB	82.10			GB	x
	LF	22.60			LF	27.51
	BF	52.00			BF	x
	Ld	62.31			Ld	61.16
	HP	41.2			HP	43

Figure 3. Calculations for Estimating Withers Height in Umm El-Jimal Horse.

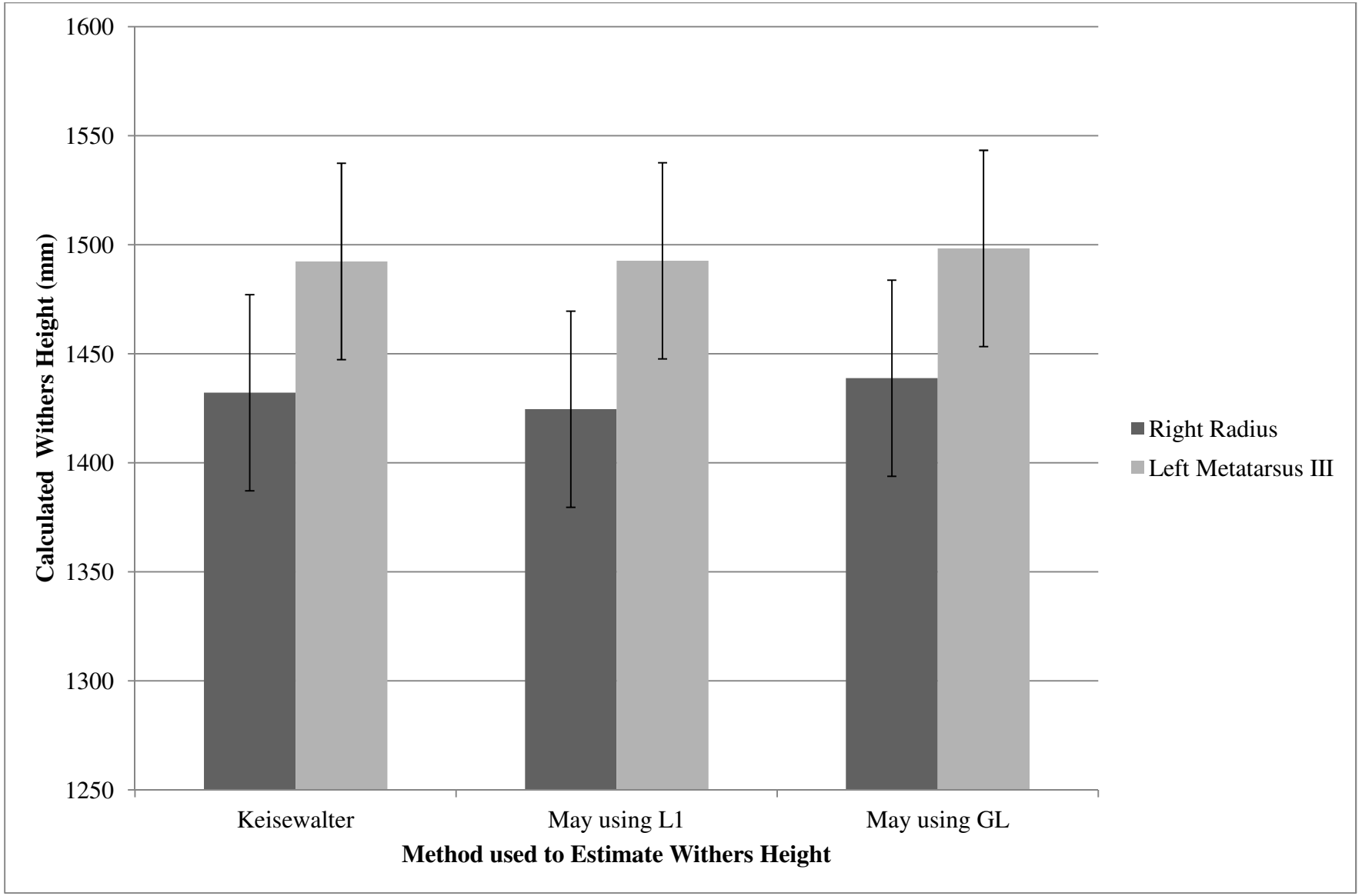
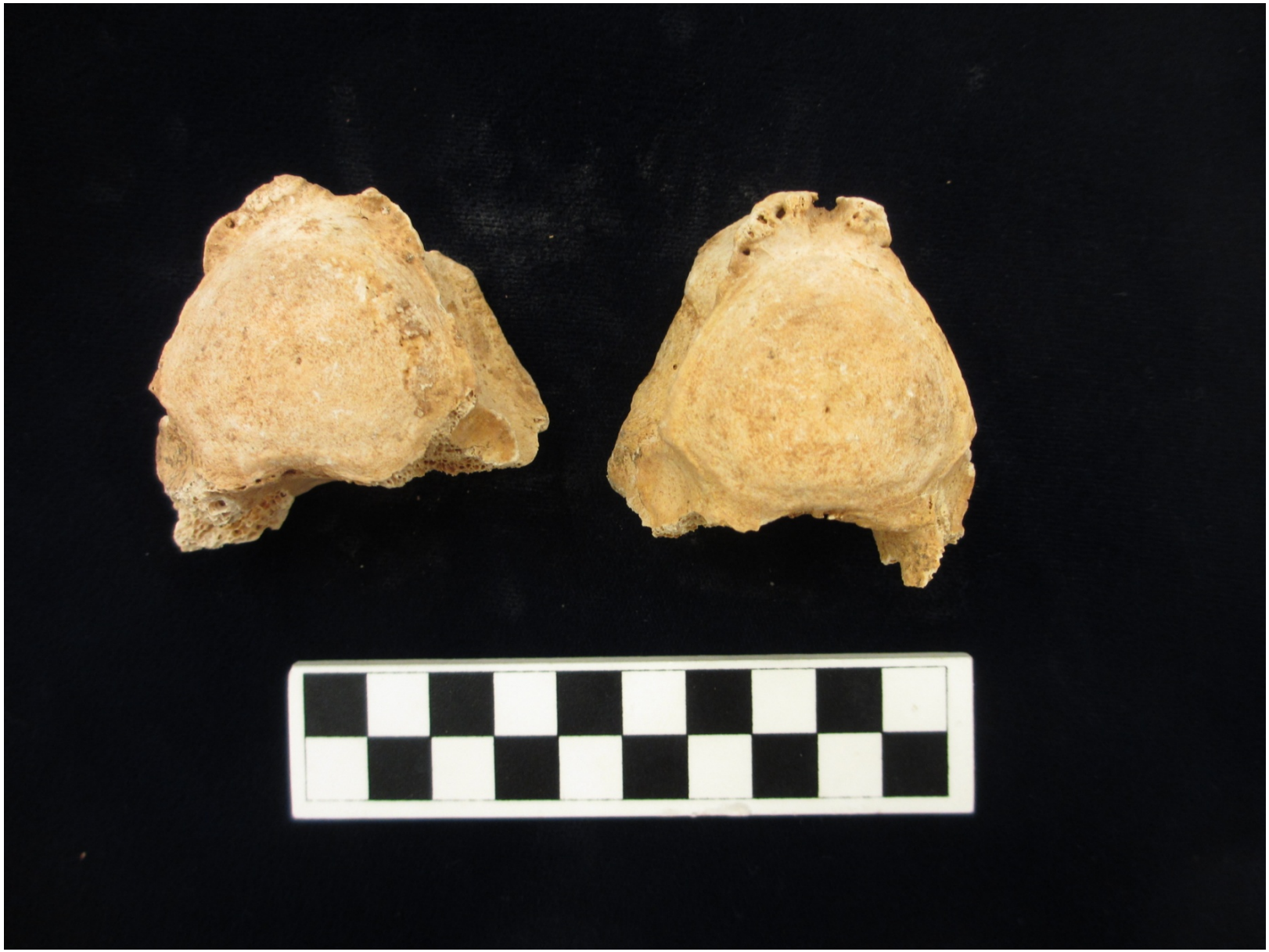


Figure 4. Incisor from Umm el-Jimal horse exhibiting osteoarthritis and green staining from copper alloy.

Figure 5. Thoracic vertebrae from Umm el-Jimal horse exhibiting lipping of vertebral body from osteoarthritis.



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